

Watersheds

Abstract

A watershed is an area that drains all precipitation received as a runoff or base flow (groundwater sources) into a particular river or set of rivers. Canada's ocean watersheds are the Atlantic Ocean, Hudson Bay, Arctic Ocean, Pacific Ocean and Gulf of Mexico.

A watershed is an area where all surface water drains into the same body of water (river, lake, or ocean). Surface water consists of the tiny trickles of water flowing on the surface of the Earth that develop into larger streams and eventually combine to form rivers and lakes.

Rivers are organized into networks, each with its own recharge area upstream, and drainage channel and mouth downstream. Networks are ordered from ocean to main rivers to secondary rivers to streams, which correspond to ocean watersheds, river watersheds, sub-watersheds, sub-sub-watersheds, and so forth. The boundary of a watershed is called a watershed divide.

In a watershed, water flows from high to low, from upstream to downstream. Watershed recharge is a function of precipitation, soil and bedrock permeability, absorption of water in the soil by plant roots, and evapotranspiration. As part of the latter process, plants return moisture to the atmosphere by transpiration, and the water eventually returns to Earth in the form of precipitation (for example, as rain, snow or hail).

The easiest way to describe the network of rivers and lakes on a small-scale map is to show the watersheds. In Canada, there is a detailed hierarchy of watersheds, ranging from the largest (drainage into oceans and their equivalents), down to the smallest ramification.

Location and Main Rivers of Ocean Watersheds

The **Pacific Ocean watershed** drains the area west of the Rocky Mountains. The Fraser, Yukon and Columbia rivers are the largest rivers draining this region. It is separated from all other drainage areas by the continental divide. This is defined as the north-south line along the western Cordillera that separates rivers flowing ultimately into the Pacific Ocean from those flowing into other oceans.

The **Arctic Ocean watershed** is the area flowing directly into the Arctic Ocean or into the channels of the Arctic Islands. Hudson Bay, James Bay and Ungava Bay are considered to be part of the Arctic Ocean but, for most purposes, their drainage area

is usually considered as a separate entity. The Mackenzie River dominates the Arctic Ocean watershed.

The **Hudson Bay watershed** is a huge area that captures about 30% of total Canadian runoff. Many of its river systems, such as the Nelson and Churchill rivers (of Manitoba), drain eastward from the continental divide to Hudson Bay. As well, many large rivers drain from the south and east into Hudson Bay or James Bay. The extensive areas of drainage into Ungava Bay and Foxe Basin are also considered to be part of the Hudson Bay drainage area.

The **Atlantic Ocean watershed** is dominated by the Great Lakes–St. Lawrence system, but there are other significant watersheds, such as those of the Churchill River (of Labrador) and the Saint John River in New Brunswick.

The **Gulf of Mexico watershed** occupies in Canada a small portion of southern Alberta and Saskatchewan. The waters drain south into the Mississippi system, which ultimately drains into the Gulf of Mexico. (The Gulf is part of the Atlantic Ocean but, because of the Mississippi, it is often studied as a separate entity).

Finally, parts of Alberta and Saskatchewan have closed watersheds or areas of internal drainage: these are river systems that do not drain into any ocean.

Mapping Note

On this map, the watershed hierarchy is based on the size of the drainage area, not on river flow (discharge) as was the criterion to map drainage basins. Furthermore, smaller watersheds were delineated in highly populated regions and watershed names are based on local water features. Some small water diversions were included and named. The watershed hierarchy used on this map can be aggregated to the Water Survey of Canada's sub-basins: a system compatible with Canada's water gauging stations.

Map Sources

Watersheds

Natural Resources Canada. 2006. Atlas of Canada Watershed Framework.

References

Environment Canada. 2004. Threats to Water Availability in Canada. National Water Research Institute, Burlington, Ontario. NWRI Scientific Assessment Report Series No. 3 and ACSD Science Assessment Series No.1.

Related Web sites (1999 – 2009)

Federal Government

Environment Canada. Freshwater Web Site

<http://www.ec.gc.ca/water/>

This web site gives access to the nature of water, water policy and legislation, the management of water, water and culture, and informational resources and services.

Environment Canada. National Water Research Institute

<http://www.ec.gc.ca/inre-nwri/>

The National Water Research Institute (NWRI) is Canada's largest freshwater research establishment. NWRI conducts a comprehensive program of research and development in the aquatic sciences, in partnership with the Canadian and international science communities.

Environment Canada. St. Lawrence Centre

<http://www.qc.ec.gc.ca/csl/>

The St. Lawrence Centre (SLC) is involved in a multitude of studies and research programs aimed at better understanding how the ecosystems of the St. Lawrence River function and at keeping this knowledge up to date.

Environment Canada. Water Survey of Canada

http://www.wsc.ec.gc.ca/index_e.cfm

The Water Survey of Canada is the national agency responsible for the collection, interpretation and dissemination of standardized water resource data and information in Canada

Government of Canada. RésEau : Building Canadian Water Connections

<http://map.ns.ec.gc.ca/reseau/en/index.aspx>

Statistics Canada. Canada's Watersheds: The Demographic Basis for an Urban-Rural Dialogue

<http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=21-006-XIE2005006&lang=eng>

Other

Canadian Wildlife Federation. Watershed - more than just water- explore yours!

http://www.cwf-fcf.org/pages/wildprograms/wildprogramsweb_e.asp?section=6&language=e

